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The purpose of this conference was to provide a forum for the dissemination and discussion of cutting edge research in the fields of molten salt chemistry and liquid metal physics. The scheduled conference program included 23 invited speakers these speakers were split 13-10 between molten salts and liquid metals, respectively. Although there was no overall conference theme, the research topics that were explored during the conference were loosely organized according to the following subtitles: the structure of liquid metals, spectroscopy in molten salts, low temperature molten salt systems, metal-insulator transitions, technological applications of molten salts, novel synthetic chemistry in molten salts, and expanded liquids. Two poster sessions were held in conjunction with the lectures; approximately 50 of the attendees participated in these poster sessions, and many of the invited speakers also presented posters. The conference was truly international in flavor and included participants from Belgium, Canada, France, Germany, Hungary, Ireland, Japan, Norway, Russia, Sweden, Switzerland, the United Kingdom, Ukraine, and the U.S.A. of the 78 registered attendees, 7 were graduate students, 10 were postdoctoral students, 16 were research scientists, 40 were university faculty members and were research directors or program managers.

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ABSTRACT

AFOSR Grant No. F49620-97-1-0044

Gordon Research Conference on Molten Salts=
and Liquid Metals

August 3-8, 1997, New England College, Henniker, NH

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The purpose of this conference was to provide a forum for the dissemination and discussion of cutting edge research in the fields of molten salt chemistry and liquid metal physics. The scheduled conference program included 23 invited speakers; these speakers were split 13-10 between molten salts and liquid metals, respectively. Although there was no overall conference theme, the research topics that were explored during the conference were loosely organized according to the following subtitles: the structure of liquid metals, spectroscopy in molten salts, low temperature molten salt systems, metal-insulator transitions, technological applications of molten salts, novel synthetic chemistry in molten salts, and expanded liquids. Two poster sessions were held in conjunction with the lectures; approximately 50 of the attendees participated in these poster sessions, and many of the invited speakers also presented posters. The conference was truly international in flavor and included participants from Belgium, Canada, France, Germany, Hungary, Ireland, Japan, Norway, Russia, Sweden, Switzerland, the United Kingdom, Ukraine, and the U.S.A. Of the 78 registered attendees, 7 were graduate students, 10 were postdoctoral students, 16 were research scientists, 40 were university faculty members, and 5 were research directors or program managers.

**1997 GORDON RESEARCH CONFERENCE
on MOLTEN SALTS AND LIQUID METALS
FINAL PROGRESS REPORT**

**AIR FORCE OFFICE OF SCIENTIFIC RESEARCH
GRANT NO. F49620-97-1-0044**

The Gordon Research Conference (GRC) on MOLTEN SALTS AND LIQUID METALS was held at NEW ENGLAND 2 from 8/3/97 thru 8/8/97. The Conference was well-attended with 80 participants (attendees list attached). The attendees represented the spectrum of endeavor in this field coming from academia, industry, and government laboratories, both U.S. and foreign scientists, senior researchers, young investigators, and students.

In designing the formal speakers program, emphasis was placed on current unpublished research and discussion of the future target areas in this field. There was a conscious effort to stimulate lively discussion about the key issues in the field today. Time for formal presentations was limited in the interest of group discussions. In order that more scientists could communicate their most recent results, poster presentation time was scheduled. Attached is a copy of the formal schedule and speaker program and the poster program. In addition to these formal interactions, "free time" was scheduled to allow informal discussions. Such discussions are fostering new collaborations and joint efforts in the field.

I want to personally thank you for your support of this Conference. As you know, in the interest of promoting the presentation of unpublished and frontier-breaking research, Gordon Research Conferences does not permit publication of meeting proceedings. If you wish any further details, please feel free to contact me. Thank you.

Sincerely,

A handwritten signature in dark ink, appearing to read "Allen F. Albright". The signature is fluid and cursive, with the first name "Allen" and last name "Albright" clearly distinguishable.

Molten Salts and Liquid Metals

New England College

Henniker, NH

August 3 - 8, 1997

Chair: **Charles L. Hussey** (University of Mississippi)

Vice-Chair: **David L. Price** (Argonne National Laboratory)

Sunday, 3 August

Structure

Discussion leader: **Peter S. Pershan** (Harvard University)

- **Stuart A. Rice** (University of Chicago) - "Structure of the Liquid-Vapor Interface of Metals and Alloys"
 - **Shankar Krishnan** (Containerless Research) - "The Atomic Structure of Liquids Studied with X-rays and the Electronic Structure of Liquids Studied with Optical Techniques"
-

Monday, 4 August

Structure (con't)

- **Marie-Louise Saboungi** (Argonne National Laboratory) - "High Energy X-rays and Hot Liquids"
- **John Van Zytveld** (Murdoch Trust) - "Chemical Short Range Order in Metallic Liquid Alloys"

Spectroscopy in Molten Salts

Discussion leader: **Murray H. Brooker** (Memorial University of Newfoundland)

- **Sheng Dai** (Oak Ridge National Laboratory) - "Spectroscopy of Actinides in Molten Salts and High-Temperature Fiber Optic Spectroscopic Instrumentation"

Low Temperature Molten Salt Systems

Discussion leader: **Richard T. Carlin** (Covalent Associates)

- **Robert A. Osteryoung** (North Carolina State University) - "Some Studies of Latent and Bronsted Acidity in Chloroaluminate Molten Salts"
- **Jerry L. Atwood** (University of Missouri, Columbia) - "Liquid Clathrates as a Generalization of Molten Salts"

- **Pierre Bonhôte** (Lausanne) - "Hydrophobic Highly Conductive Ambient-Temperature Molten Salts: Properties and Applications"

Tuesday, 5 August

Metal Insulator Transitions

Discussion leader: **Simon C. Moss** (University of Houston)

- **John E. Enderby** (University of Bristol) - "Liquid Semiconductors"
- **William J. Nellis** (Lawrence Livermore National Laboratory) - "Metallization of Fluid Molecular Hydrogen at 1.4 MBar"
- **Kozaburo Tamura** (Hiroshima University) - "Structural Changes and the Metal-Nonmetal Transition in Supercritical Fluids"

Technological Applications of Molten Salts I

Discussion leader: **John S. Wilkes** (USAF Academy)

- **Harald A. Øye** (Norwegian Institute of Technology) - "Recent Scientific and Technical Advances in the Electrolytic Production of Aluminum"
- **Yasuhiko Ito** (Kyoto University) - "Electrochemical Implantation to Form Thin Films in Molten Salts"

Poster Session I

Discussion leader: **David L. Price** (Argonne National Laboratory)

Wednesday, 6 August

Technological Applications of Molten Salts II

Discussion leader: **Gery R. Stafford** (National Institutes of Standards and Technology)

- **Donald R. Sadoway** (MIT) - "Measurements of the Electrical Properties of Oxide Melts: Towards New Electrolytic Technologies"
- **Jack P. Winnick** (Georgia Institute of Technology) - "Electrolytic Removal of Halogens, SO₂, and H₂S from Waste Streams with Molten Salt Membranes"
- **Nobuyuki Koura** (Tokyo University of Science) - "Room-Temperature Molten Salt Electrolytes for Non-Flammable Lithium and Aluminum Batteries"

Expanded Liquids

Discussion leader: **Ashok K. Adaya** (University of Abertay, Dundee)

- **Friederich Hensel** (Philips Universität, Marburg) - "Phase Transitions in Metallic Fluids"
 - **Roland Winter** (University of Dortmund) - "Structure and Electronic Properties of Expanded Liquid Alloys"
 - **Fumiko Yonezawa** (Keio University) - "Electronic and Transport Properties of Liquid Selenium in the Supercritical Region"
-

Thursday, 7 August

Novel Synthetic Chemistry in Molten Salts

Discussion leader: **Kenneth R. Seddon** (Queen's University of Belfast)

- **Kenneth R. Seddon** (Queen's University of Belfast) - "Industrial Applications of Room-temperature Ionic liquids"
- **Angelica M. Stacy** (University of California, Berkeley) - "Precipitation of Oxide Superconductors from Molten Hydroxides"
- **Timothy R. Hughbanks** (Texas A & M) - "Octahedral Zirconium Clusters in Haloaluminate Molten Salts; Spectroscopy and Chemistry"

Novel Synthetic Chemistry in Molten Salts (con't)

- **Gyorgy Kaptay** (University of Miskolc) - "Electrochemical Synthesis of Refractory Borides from Molten Salts"
- Business Meeting

Poster Session II

Discussion leader: **David L. Price** (Argonne National Laboratory)

Conference Registration List

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05-Aug-9

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